CONNECTOR STRIP

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] This invention relates to a connection and spacing device for building frame elements such as roof trusses, wall studs and floor joists.

2. Description of the Art

[0002] Various nail plates and other connector members are known in building industry for providing a connection between timber frame members. An example of such connectors is the "Triple Grip" made by Pryda Australia for connecting a roof truss to the top frame member of the wall. The Triple Grip, and similar connectors available from other connector manufacturers such as the Heavy Truss Clip (HTC) by Simpson Strong Tie (USA) include flanges in three orthogonal planes to bear against the top and side surfaces of the wall top plate and against the side of the bottom chord of the roof truss, which is orthogonal to the wall top plate.

[0003] In use, the builder attaches a series of the connectors to the wall top plates of the supporting walls at regular spaced locations corresponding to the desired truss locations and secures these to the top plate by nailing or screwing through apertures in the flanges. The trusses are then positioned against the upstanding plates of the respective connectors and similarly secured, thus connecting the truss to the wall frame.

[0004] Whilst performing these operations, the builder typically is standing balanced on the wall frame top plate, usually several metres off the ground.

SUMMARY OF THE INVENTION

[0005] The invention has as an object the provision of such a device to facilitate the erection of structures, particularly the location and attachment of roof trusses, floor joists and other building frame elements which require attachment by means of connectors at regular intervals.

[0006] In one form, the invention resides in a building element connection and spacing device including a member of substantially inextensible material, a connector located at at least one longitudinal position on said member for providing a connection between building elements, and at least one index at a longitudinal position on said member corresponding to an element spacing distance.

[0007] A further form of the invention provides a building element connection and spacing device including a member of substantially inextensible material, a connector attachment location at at least one longitudinal position on said member, a connector adapted for attachment at said connector attachment location for providing a connection between building elements, and at least one index at a longitudinal position on said member corresponding to an element spacing distance.

[0008] The index may be a second or further connector location.

[0009] In one preferred form of the invention the member is a strip, for example of metal, a connector is attached to the strip at a first longitudinal position and at at least one further longitudinal position, the spacing between the connectors corresponding to the element spacing distance.

[0010] In another form of the invention, a connector is attached to a strip which, adjacent its end remote from the attached connector, is structured for the location of the connector of a similar, subsequently located device such that the successive connectors so located are spaced by the element spacing distance.

[0011] Preferably, the connector provides a substantially orthogonal connection between a first building element and a series of spaced-apart second building elements connected to said first building element, such as between a wall frame and a roof truss or between bearers and floor joists and wall frame bottom members and studs.

[0012] The element spacing distance may be the spacing between successive roof trusses to be attached by means of the connectors to a wall top plate. In other embodiments of the invention, the element spacing distance may, for example, be the spacing between successive floor joists or wall studs.

[0013] The invention also provides a method of erecting a building frame including a first building element of a building frame and a series of spaced-apart second building elements connected to said first building element, including the steps of:

erecting a building frame portion including said first building element;

attaching to said first building element at least one building element connection and spacing device including a member of substantially inextensible material, a connector located at at least one longitudinal position on said member for providing a connection between first building element and a said second building element, and at least one index at a longitudinal position on said member corresponding to a second building element spacing distance;

attaching said second building element to said connector at said one longitudinal position;

locating a further similar connector at said index position;

attaching said further connector to said first building element; and

attaching a further second building element to said further connector.

[0014] Further forms of the invention provide a building frame including a first building element of a building frame and a series of spaced-apart second building elements connected to said first building element, wherein said first and second building elements are connected by said connection and spacing devices and/or wherein said frame is erected using said method.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] Further preferred embodiments of the invention will now be described with reference to the accompanying drawings, in which:

[0016] Fig. 1. is an isometric view of a connector strip in a first embodiment of the invention for the fixing and location of wooden roof trusses;

[0017] Fig. 2 is a fragmentary isometric view of portion of the connector strip of Fig. 1;

[0018] Fig. 3 is a fragmentary isometric view of portion of a modified form of the connector strip;

[0019] Fig. 4 is a section taken on the line 4-4 of Fig. 3;

[0020] Fig. 5 is a section taken on the line 5-5 of Fig. 3;

[0021] Fig. 6 is a local view at 6-6 of Fig. 3;

[0022] Fig. 7 is an isometric view of part of a building frame with trusses located and fixed by means of strips of the first embodiment of the invention;

[0023] Fig. 8 is an isometric view of part of a building frame with studs located and fixed by means of strips of the invention;

[0024] Fig. 9 is an isometric view of part of a building frame with joists located and fixed by means of strips of the invention;

[0025] Figs. 10a and 10b illustrate a second embodiment of the invention;

[0026] Fig. 11 is an isometric view of a third embodiment of the invention;

[0027] Fig. 12 is a plan view of a fourth embodiment of the invention;

[0028] Fig. 13 is an isometric view of a fifth embodiment of the invention;

[0029] Fig. 14 is an isometric view showing devices of the kind illustrated in Fig. 13 used in the erection of roof trusses;

[0030] Fig. 15 is a more detailed elevation of a portion of Fig. 14, with part of the roof truss bottom chord cut away;

[0031] Fig. 16 is an isometric view of part of a building frame showing use of the devices of Fig. 13 for erection of floor, wall and roof structures; and

[0032] Figs. 17a and 17b illustrate a sixth embodiment of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0033] As shown in Figs. 1 and 2, a roof truss connection and spacing device 20 may be provided in the form of a strip 21 of suitable material such as galvanised steel, formed with a side flange 22 and a top flange 23, to which there are attached at

spaced intervals, connectors 24, each of which is formed with a first flange 25 attached to the side flange 22 and a second flange 26 at right angles to the first flange 25. The connectors 24 may be formed from galvanised steel sheet or strip, suitably of 1.2 mm thickness, while the strip 21 is suitably 0.75 mm in thickness.

[0034] The side 22 of the strip 21 and the connectors 24 are punched at intervals with nail holes respectively shown at 27 and 27A.

[0035] As shown in Fig. 1, in this first embodiment of the invention the strip 20 carries three connectors 24. The first of these is fixed to the strip near one end, and is orientated oppositely to the other two connectors, with its second flange 26 facing away from them. The distance between successive second flanges is in this embodiment 600 mm, the desired spacing of the trusses which are to be located and fixed with the aid of strips 20. It will be understood that strips may be manufactured for other truss spacings, such as 450 mm, in an otherwise similar way. At each end of the strip, the flange 26 is spaced from the strip end by one half of the nominal thickness of the trusses for which the product is intended, for example 17.5 mm.

[0036] The connectors 24 may be fixed to the side flange 22 in any suitable way, for example by spot welding, swaging or by interengaging formations. Illustrated in Figs. 3-6, however, is one preferred approach. Here the flange 22 includes a stiffening rib 28 and the connector flange 25 is swaged to the strip through a hole 29 in the flange. To prevent rotation of the connector about this connection prior to fixing of the connector, tongues 30 are punched out from the strip to form joggles bearing against the edge of the flange 25.

[0037] Devices of the kind thus far described may be employed in the erection of roof trusses by laying out successive strips along the wall plates of a pair of parallel walls between which the trusses are to span, with each successive strip being attached to the top plate at the correct location by bringing its end up against the end of the previously laid strip. Fig. 7 illustrates a partly completed frame erected in this way.

[0038] The first strip will normally be located with its free end one half of the truss width from the first end of the wall top plate 31, not shown in Fig. 7. Each strip and connector is quickly fixed to the top plate by driving nails into the wall plate 31 through selected holes 27 of the strips and of the flanges 25, and the trusses 50 are

then located against the connectors 24 and nailed in place through the holes 27 of the flange 26.

[0039] Strips of the kind described thus far may also be used in the location and fixing of other elements, for example wall studs 32, by locating them along the wall bottom plate 33 as illustrated in Fig. 8, and joists 34 by fixing strips to bearers 35 as shown in Fig. 9.

[0040] Instead of being provided with nail holes 27, the strip 20 and/or the connectors 24 may be formed with formations of struck teeth in the manner of a nail plate.

[0041] In other forms of the device, the connectors are not attached to the strip or other during manufacture, but are supplied separately, and the connectors and strip are provided with complementary formations to facilitate the correct location of the connectors along the strip.

[0042] Fig. 10a shows a second embodiment of the invention, in which a strip 120 has only the first connector 124 fixed to it, and has a length which is equal to the truss spacing plus the nominal thickness of one truss. Such a device is preferably manufactured in a right and left-handed form, the latter being illustrated in Fig. 10b, so that the application of the strips to the top plates can commence at the same end of the roof to minimise errors in alignment of the trusses.

[0043] Preferably, the ends of the strips 120 are slightly upturned to provide a butting surface for the next strip, to reduce the risk of overlapping the strips and thereby fixing them in the wrong location.

[0044] A further alternative form of the invention is shown in Fig 11, where the strip 220 is formed from flat steel strip with sufficient flexibility to enable it to be coiled for packaging and transport. A long strip 220 with pre-attached connectors 224 may then be uncoiled as it is attached along the wall plate or other structural member. In such an embodiment also, and indeed in all non-symmetrical embodiments of the invention, left and right-handed strips are provided to enable the application of the strips to start from the same end of the frames.

[0045] Fig. 12 illustrates an alternative coilable form of the invention in which the connectors are attached to the coilable strip in a plane at right angles to that

illustrated in Fig. 11, so that in the coiled form, the connectors lie in the plane of the coil.

[0046] Fig. 13 illustrates a further embodiment of the invention in which elongates strips 420 are attached to brackets 424 which are now saddle-shaped, with opposed flanges 425 engaging opposite sides of the top plate or other frame element (not shown), these flanges being joined by a web 436 from which extends a connecting flange 426.

[0047] A rib 437 in the centre of the web 436 receives the end portion of the strip 420, which may be swaged to the web 436 at 438. The rib 437 may extend upwardly as a stiffening rib through the flange 426 as shown.

[0048] The strip 420 is provided with a longitudinal stiffening rib 438, and its free end is upturned at 439 to engage within and abut the rib 437 of the next bracket as the devices are successively attached along the wall top plate or other frame element.

[0049] A number of devices of the kind illustrated in Fig. 13 may be stacked in nesting fashion by overlapping their webs 436, flanges 425 and strips 438. To maintain the parallelism of such a nested stack, and upturned portion 440 may be provided at the forward edge of the rib 437, the height of this portion being set to correspond with the height of the upturn 439 at the free end of the strip 420.

[0050] If desired, such stacking may be further facilitated by setting the free edges of the flanges 425 inwardly towards each other, and stiffening this configuration by means of ribs 441, so that the flanges 425 of the stacked devices grip each other to hold the stack together.

[0051] Figs. 14 and 15 show how devices configured as shown in Fig. 13 are attached successively to a wall top plate 431, with the web 436 and side flanges 425 straddling the plate, and nailed to both side surfaces of the plate, as well as the top surface if desired. For greater clarity, part of the roof truss bottom chord is cut away and shown in section in Fig. 15.

[0052] The connecting flange 426 extends across the full width of the plate and provides a greater surface for fixing to the bottom chord of the truss 450 or other element, a useful feature since it provides greater scope for avoiding obstruction by the adjacent truss nail plate that connects the bottom and top truss chords. Furthermore, the arrangement provides a large area for connection to both the wall top

plate 431 and the truss 450, and thus high connection strength providing a strong structural connection resisting uplift forces on the truss.

[0053] In addition, it will be noted that the connector and spacing devices of Figs. 13 to 15 are substantially symmetrical about their longitudinal axes, and thus the need to provide the device in left- and right-handed versions is eliminated.

[0054] Fig. 16 shows the devices in use in several contexts within the building structure: connecting the floor joists 434 to the bearers 435, the upright wall studs 432 to the wall bottom plate 433, and the trusses 450 to the wall top plate 431. In each case, the dimensions of the connector portion of the device is adapted to saddle the bearer 435, bottom plate 433 or top plate 431 to which it fits, and the length of the strip 420 adapted to set the spacing required.

[0055] The extraordinarily wide variety of forms in which the present invention may be embodied is further exemplified by Figs. 17a and 17b, in which a series of connectors 524, each comprising first and second flanges 525 and 526, are connected by means of a line 520 of flexible but inelastic material such as wire or high tensile strength plastics.

[0056] The connectors are attached to the line 520, for example by welding or gluing, at 541 on the flange 525, at the element spacing distance, for example 600 mm. The first flange 525 of each successive connector is attached to the face of a wall plate or other member after drawing tight the line 520 from the preceding connector. Thus the line 520 substitutes for the strip 20, 120 etc of the preceding embodiments.

[0057] As shown in Fig. 17b, before use the line 520 may be removably coiled against the second flange 526, to which it may be attached by a readily breakable adhesive joint or other frangible connection. Alternatively, this embodiment of the invention lends itself to manufacture in plastics material, wherein the line 520 may be integrally moulded as a coil against the flange 526 with a frangible attachment to the flange.

[0058] To assist in the attachment and alignment of the connectors 524 to the wall plate or other member, tongues 542 may be struck out from the flange 525 to locate against the top surface of the wall top plate.

[0059] Other forms of this approach, where the member which sets the spacing of the connectors is in a flexible form, are of course possible, and within the scope of

the present invention. For example, rather than an arrangement where the connectors are supplied fixed to the flexible member, the member may be provided with attachment formations, for example loops or eyelets, at the required indexing distance, and the connectors attached to these by means of complementary formations, as the line and the successive connectors are strung out along the work.

[0060] It will thus be understood that the present invention is capable of embodiment in many forms, and is in no way limited to the embodiments which have been given here by way of example only.

[0061] In the specification, the word "comprising" is understood in its "open" sense, that is, in the sense of "including", and thus not limited to its "closed" sense, that is the sense of "consisting only of". A corresponding meaning is to be attributed to the corresponding words "comprise, comprised and comprises where they appear.

[0062] While particular embodiments of this invention have been described, it will be evident to those skilled in the art that the present invention may be embodied in other specific forms without departing for the essential characteristics thereof. The present embodiments and examples are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein. It will further be understood that any reference herein to known prior art does not, unless the contrary indication appears, constitute an admission that such prior art is commonly known by those skilled in the art to which the invention relates.